Requirements Review and Analysis Process

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Mr. Moren began his presentation with a description of the needs and requirements timeline that covers the period December 1999 (First WIST Symposium) through May 2001 (publication of a comprehensive requirements document). The intermediate milestones included data gathering efforts, meetings of OFCM's interdepartmental committee and joint action group, and participating in a stakeholder meeting sponsored by the Federal Highway Administration (FHWA).

Since initiating the data gathering process over two years ago, OFCM has mailed several hundred surveys and questionnaires to federal agencies, public and private transportation users, and meteorological service providers from the public and private sector. Data gathering began prior to and following the First WIST Symposium. The information being collected were:

- impacts of weather on the responding organization's mission
- specific weather factors or phenomena that impact the stated mission
- descriptions on specific actions taken or decisions made based on the weather information
- time and scale of weather events and area of operation
- current provider or source of weather information
- current means of receiving weather information
- topography

In addition to data gathering via the mail, the OFCM staff members conducted interviews with representatives of federal agencies in the Washington metropolitan area. The focus of the data gathering effort was to determine (a) what the weather providers provide and (b) what weather factors the customers require. An initial step within the design/query phase was the identification of the four modes of transportation—roads, railways, waterways, and pipelines. To present a comprehensive view of surface transportation activities, airport ground operations and emergency response were added to the list.

The database contained administrative, scale, and data records. The administrative records contained contact information and identified the transportation mode—road, rail, waterway, pipeline, airport operations, and emergency response. Of the 262 records in the database, the majority (157) of the records fell in road transportation mode with the remaining records in rail (47), pipeline (5), waterway (32), emergency response (18), and other (3).

Scale records addressed topography, time, and spatial resolution. Because topography is a factor in precipitation events, this piece of information is critically important in winter weather and road maintenance activities. Time resolutions, or lead-time prior to events, were broken down into *planning* (climatological and seasonal outlooks, 3-6 months); *preparation* (near-term forecast; 1-3 day); and *actual event* (on-going; 1-6 hours). Spatial resolution identified the need for synoptic scale (30-70 km) and mesoscale (< 10 km).

Data records addressed 26 different weather elements and include thresholds, type, and any amplifying notes, where appropriate and when provided in the responses. The responses identifying a specific weather element that impacted transportation ranged from optics (sun glare along highways) to pollution (requires transit to implement free ride days) to precipitation (wet roads cause congestion).

Examples of database output identified precipitation, icing, visibility, flooding, wind speed, thunderstorms, tornadoes, and air temperature as the factors of greatest concern to transportation operators. The records indicated that any precipitation (not a specific amount or intensity) was significant.

In conclusion, the data and information collected, thus far, supports the need to further develop the WIST Requirements document. In addition to the information already provided, more specifics are necessary to refine the impacts and benefits of weather on transportation operations. One common thread throughout the data is the need for weather information that is available faster, better, more accurate, and on time.

Follow-up Discussion

Currently available weather sources do not always provide the specific piece of information that many users and travelers seek. For example, during a recent winter weather episode, television sources were more inclined to report where snow was falling rather than describe road conditions along the interstate highways. While traffic cameras show where precipitation is falling, there is an overall absence of reports on road conditions.

Road pavement temperatures are of particular interest to road maintenance personnel and decision makers as well as travelers and commuters. One current source for pavement temperature is from embedded roadway sensors; but these pavement temperature readings are few and the data is not routinely shared among all potential users, usually outside the state DOT. The use of air temperature to derive pavement temperature is neither accurate nor favorable. Early research results have indicated the potential use of skin or earth surface temperatures from satellites. Remotely sensed skin temperatures are available in cloud free areas and can be used as input to numerical models in lieu of roadway pavement reports. Thermal imaging and mapping techniques are also being developed to address this need.

While many of these techniques are available today, not all information and technology is being used and applied effectively and efficiently.

The Federal Highway Administration estimates the direct cost benefits ratio for snow and ice control when weather information is used to be approximately 5 to 1 ratio. The return on investment in road weather information systems and other highway infrastructure to support winter maintenance activities is roughly six years. One additional benefit of expanding RWIS, above and beyond winter maintenance needs, is the application or leveraging of the data for traveler information uses. In many instances, the overall benefits cannot be seen initially but they continue to grow as more users gain access to the information—potential benefits are not always obvious.

Link to Presentation:

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